System Description
Ascom 9d

25 February 2011/ Ver. G

Contents

1 Introduction 2
1.1 Abbreviations and Glossary 2
2 Building Blocks 4
2.1 Building Blocks Connections 7
3 Telephony Functions 8
3.1 Analogue Individual Lines 8
3.2 CAS+ Individual Lines 10
3.3 QSIG/DPNSS Interface 11
3.4 CCS Interface 12
4 Messaging Functions, IMS 14
4.1 Integrated Message Server (IMS) 14
4.1.1 Supported Messaging and Alarm Functions 15
4.2 Basic Messaging 15
4.3 Customized Groups 15
4.4 Messages with Manual Acknowledge Request 15
4.5 Messages with Delivery Receipt Request 16
4.6 SMS (Short Message Service) 16
4.7 Interactive Messaging 16
4.8 Broadcast Messaging 16
4.9 Multicast Messaging 16
4.10 Absence Handling 16
4.11 Data from Handset 17
4.12 DECT Phonebook Service 17
4.13 Alarm from Handset 17
4.13.1 Alarm with data 17
4.13.2 Alarm with Base Station Location 18
4.13.3 DECT Location 18
4.13.4 Supervision of Handset (Geprüfte Sicherheit GS) 18
4.14 Message Handling in IMS 18
4.14.1 Priorities 18
4.14.2 Capacity 19
5 Messaging Functions, 9dMMS 20
5.1 9d Message Mobility Server (9dMMS) 20
5.1.1 Supported Messaging and Alarm Functions 21
5.2 Basic Messaging 21
5.3 Customized Groups 22
5.4 Messages with Manual Acknowledge Request 22

5.5 Messages with Delivery Receipt Request 22
5.6 SMS (Short Message Service) 22
5.7 Conference Call 22
5.8 Absence Handling 23
5.9 Data from Handset 23
5.10 DECT Phonebook Service 24
5.11 Alarm from Handset 24
5.11.1 Alarm with data 24
5.11.2 Alarm with Base Station Location 24
5.11.3 DECT Location 24
5.11.4 Supervision of Handset (Geprüfte Sicherheit GS) 25
5.12 Message Handling in 9dMMS 25

6 System Management 26
6.1 System 900 Manager – WinBK 26
6.2 Cordless System Manager (CSM) 26
6.3 Remote Management 26
6.4 Clock Synchronisation 26

7 System Error Handling 27
7.1 IMS 27
7.2 9dMMS 27
7.3 Radio Exchange 27

8 System Logging 28

9 Related Documents 29

10 Document History 31

Appendix A: System Capacity 32
A.1 Physical limitations of a DCT1800 system 32
A.2 Capacity dependent on the configuration PBX – RE 32
A.3 Telephony 33
A.4 Alarm message sent from Handset 33
A.5 Messaging handling 34
A.6 Maximum simultaneous Calls, Alarm and Messaging per Base Station 34
A.7 Cabling 34
A.8 DECT protocol limitation 34

Appendix B: Other Documentation 36

1 Introduction

This document gives a general description of the System 9d, a cordless DECT telephony and messaging system for connection to private telephone exchanges.

The System 9d supports the DECT standard and is GAP compliant. The DECT technology gives a full integration of messaging and voice functions. The DECT-system can be integrated with System 900, as well as external applications such as different alarm systems, networks and e-mail. This gives features such as; messages to handset, alarm from handset, message acknowledgement, absent handling, and conference call.

1.1 Abbreviations and Glossary

9dMMS	9d Message Mobility Server: PC based tool that enables messaging to and from the connected cordless telephone system.
AIMS	Ascotel Information Management System
CAS	Channel Associated Signalling: one channel is used for signalling but each user has his own speech channel.
CCS	Common Channel Signalling: as CAS but here all speech channels are dynamically used by all users.
CLIP	Calling Line Identity Presentation.
CSM	Cordless System Manager: PC based tool used to configure cordless telephone systems.
DECT	Digital Enhanced Cordless Telecommunications: global standard for cordless telecommunication.
DMS	DECT Message Server: component in the 9dMMS that handles the distribution of messages.
DPNSS	Digital Private Network Signalling System.
ELISE	Embedded LInux SErver: hardware platform used for Unite modules
EMN	Enterprise Mobility Node: controls and monitors circuit switched calls and provides end-users with features like a PBX.
ESS	Enhanced System Services: Unite module that supports advanced message routing and centralised fault handling and logging.
GAP	Generic Access Profile: communication protocol standard within DECT, that guarantees compatibility of systems and components.
Hot Key	One of the ordinary number keys 0 to 9 on the cordless handset, used for single key activation.
IMS	Integrated Message Server: Unite module that enables messaging to and from the connected cordless telephone system.
IP	Internet Protocol: global standard that defines how to send data from one computer to another through the Internet

LAN	Local Area Network: a group of computers and associated devices that share a common communication line.
OAP	Open Access Protocol: XML based protocol used to create customized applications for Unite access.
PBX	Private Branch Exchange: telephone system within an enterprise that switches calls between local lines and allows all users to share a certain number of external lines.
QSIG	Q-signalling: a set of standards defined by ECMA, ESTI and ISO for connection PBX to PBX in networks.
RE	Radio Exchange: the interface between the main PBX, the Base Stations and 9dMMS / IMS.
SMS	Short Message Service: global protocol for sending messages between cordless telephones.
System 900	generic term for telePROTECT, teleCOURIER, and CTS 900 systems
TCP	Transport Control Protocol
Unite	generic term for messaging system that unites different systems, for example System 900, System 9d, and teleCARE M.
WinBK	PC based tools for installation and configuration of System 900. Included in 9dMMS.

2 Building Blocks

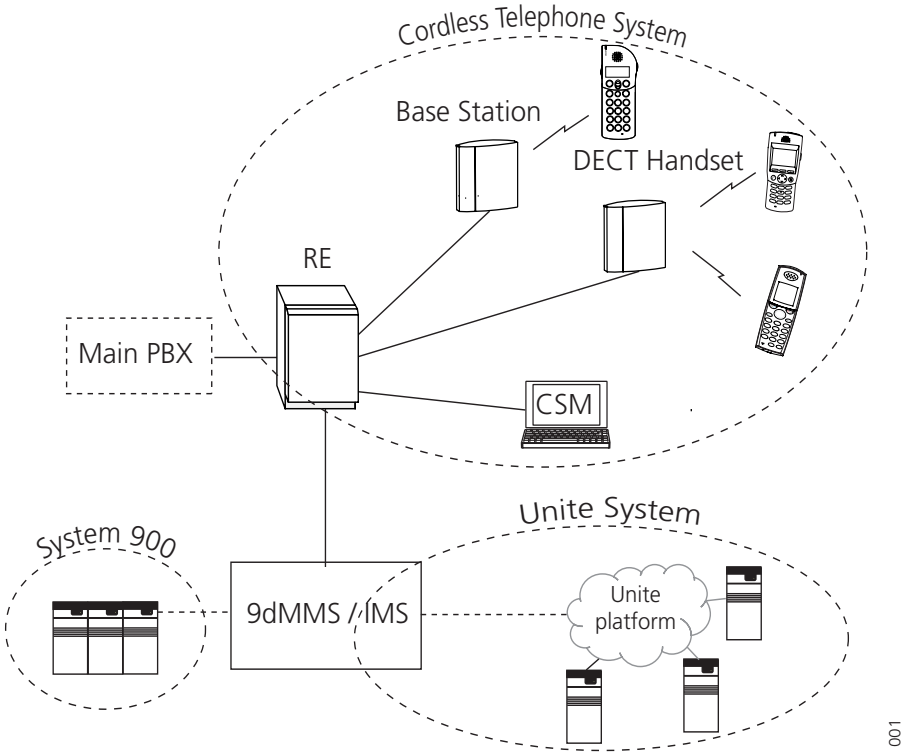


Figure 1. Building blocks

The System 9d is a pico-cellular system that is built up by:

- Cordless Telephone System containing; the Radio Exchange (DCT1800 / DCT1800-S), DECT Cordless Handsets and Base Stations (BS330 / BS340 / BS370).
- Management Software CSM
- Either a PC with Software 9d Message Mobility Server (9dMMS) or an Integrated Message Server (IMS), as messaging control and interface.
- System 900 (On Site Paging - and Personal Security Systems) can be connected to 9dMMS or IMS. System 900 includes a Central Unit and Interface modules, for example Alarm Module, Output Module etc.
- Unite System. The Unite platform makes it possible to connect other unite modules which enables enhanced functions and remote management of the System 9d.

The Radio Exchange is used as the interface between the main PBX, the Base Stations and 9dMMS/IMS. It can be connected to any main PBX, either by analogue lines and/or by a digital 2 Mbit/s link. Note that the Radio Exchange DCT1800-S only supports analogue lines.

The DECT Cordless Handsets are available in a number of versions. From handsets with basic functionality suitable in office environments to handsets suitable in environments with needs like supervision, alarm functions and EX-classification.

The Base Station (BS330 / BS340) has in total twelve channels used for communication with the user of a handset. One channel is reserved for broadcast and multicast messages.

Alarm from handset can occupy eleven channels, messages to/from handsets can occupy ten channels but only eight speech calls can be handled simultaneously, see figure 2 below.

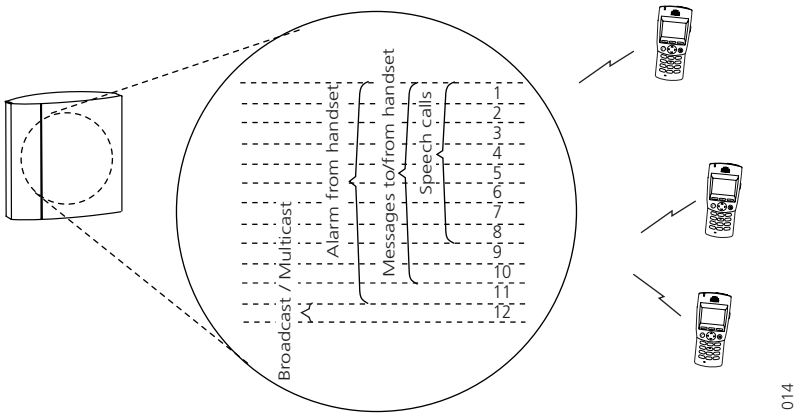


Figure 2. Channel distribution in the base Station

This means that even if a Base Station reports that it is busy i.e. fully occupied with voice calls and/or messaging, there are always channels free for alarm from handset and multicast/broadcast messages.

Note: To be able to use the reserved alarm channel a 9d24 Protector version is required.

The Wireless Relay Station (BS370) has five channels that handle speech calls, alarm and messaging. One channel is reserved for broadcast and multicast messages but it does not have any reserved alarm channel.

Both the Message Server IMS and the software 9dMMS can act as interface between the Radio Exchange and System 900 and be used for control of the messaging functions, for example, paging and alarm.
The IMS works on the Unite platform which enables enhanced functions such as; centralised system supervision, system management, remote connection, fault handling, message routing, centralised logging, broadcast and multicast messaging. The IMS can also be set to control the communication on the system bus in System 900, i.e. in a small system the Central Unit can be excluded. Using 9dMMS always requires a Central Unit in System 900.

The Central Unit is connected to other modules in System 900 such as Alarm Module, Output Module, PBX Interface, Serial Interface, and Alarm Interface. These interface modules make it possible to send predefined text messages to the cordless handsets, receive messages from cordless handsets and transform the messages to further actions.

Software CSM is required for the RE management.

Note: 1) A Central Unit is always required if messages are to be sent on the system bus in System 900.

Note: 2) 9dMMS is required for Conference Call in System 9d.

For detailed description of the building blocks, see:

- Technical Product Manual DCT1800-GAP for the Radio Exchange DCT1800, Base Stations, CSM software and the concept of DECT.
- Installation and Maintenance Guide DCT1800-S and User´s Guide DCT1800-S, for Radio Exchange DCT1800-S.
- User manuals for respective DECT Cordless Handset.
- System Description, On Site Paging System, TD 91024GB
- System Description, Personal Security System, TD 90677GB

- System Description, Unite, TD 92243GB

2.1 Building Blocks Connections

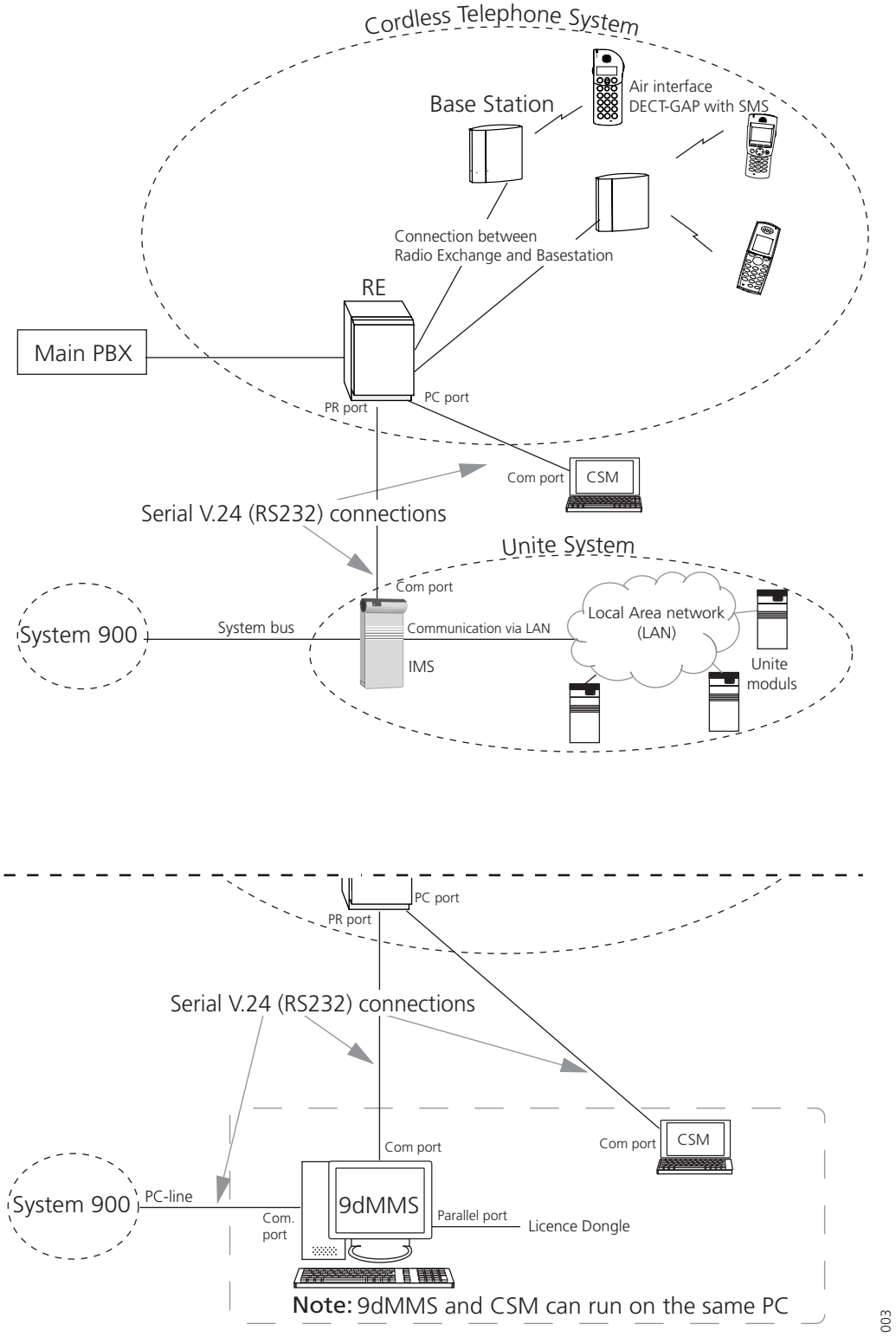


Figure 3. Blocks connections

For detailed information of which interfaces the Radio Exchange supports see, Technical Product Manual DCT1800-GAP

3 Telephony Functions

The voice handling in the system differs depending on the configuration between the main PBX and the Radio Exchange.

The connection between the Radio Exchange and the main PBX can be configured in the following ways:

- Analogue individual lines
- CAS individual lines
- QSIG (or DPNSS) Interface
- CCS Interface

3.1 Analogue Individual Lines

Configuration

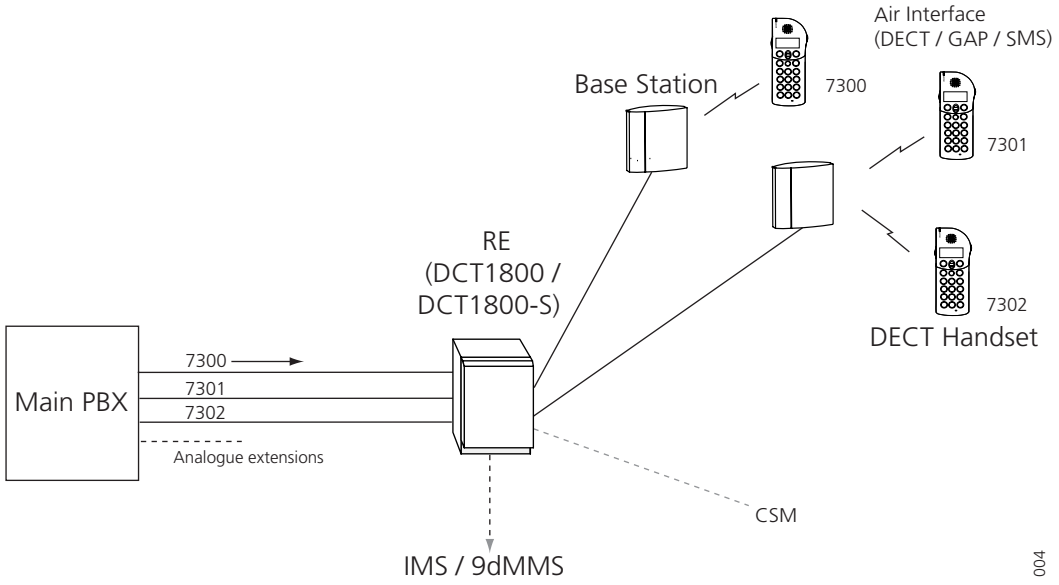


Figure 4. Every analogue line is dedicated to a specific Cordless Handset.

In this configuration all users have their own analogue extension in the main PBX. Both the DCT1800, and the DCT1800-S can be used.

Function

All PBX functions that are tied to the extension, for example call back, call transfer, call diversion, etc. can be used by the cordless handset.

When all users have their own private analogue extension in the main PBX every line is dedicated to a specific cordless handset. If the user has a desk telephone connected to the same line, the cordless handset will work in parallel with this one. That means that at an incoming call the desk telephone and the cordless handset will ring at the same time. If the

user instead has a digital desk telephone, the calls must be diverted to the analogue line, directly or after a pre-set period.

Calls from one handset to another are always switched in the main PBX.

CLIP

If the number of the calling party is supported by the PBX this is not presented in the display on the cordless handset when using analogue lines.
If the PBX is equipped with software for paging, this can however be done with a PBX interface module in system 900. To use the function, incoming calls must be diverted to the PBX interface module. An incoming call is then placed on hold for ''meet-me answer'' and data is sent to the cordless handset via system 900. When answering (at hook-off), the cordless handsets automatically dials the call-pickup code for ''meet-me answer'' which establishes the connection. A disadvantage is that if someone else is calling he/she do not get a busy indication, since the call is diverted to the PBX interface module.

The cordless handsets also support different ring signals to indicate internal and external calls.

Limitations

DCT1800

- Analogue individual lines, max. 224 (28 boards)
- Simultaneous calls, max. 60
- Base Stations, max. 200 (25 boards)
- Cordless Handsets, max. 224

Note that the DCT1800 can contain max. 36 boards including the CPU board (Central Processing Unit) which in reality gives the limitations shown in table.

Analogue lines	**Base Stations**	**Cordless Handsets**
224 (max)	56	224
80	200 (max)	80

DCT1800-S

- Analogue individual lines, max. 40
- Simultaneous calls, max. 16
- Base Stations, max. 8
- Cordless Handsets, max. 40

3.2 CAS+ Individual Lines

Configuration

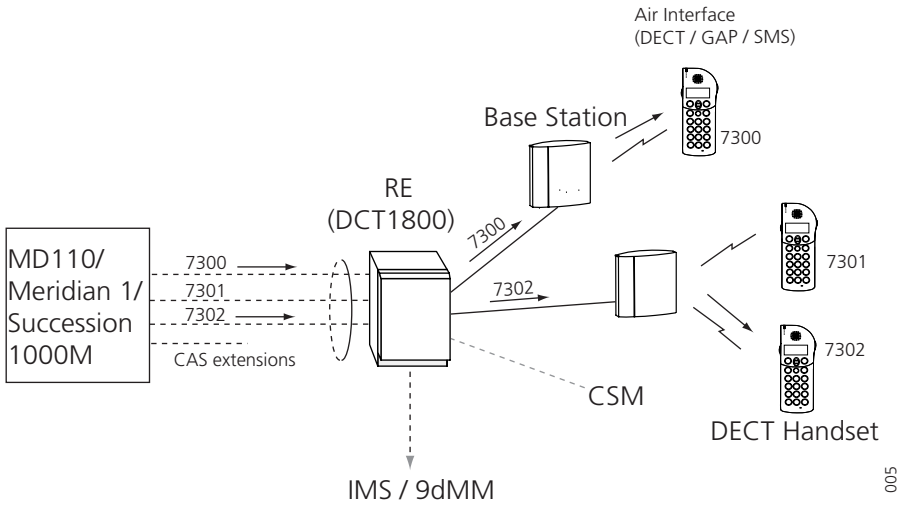


Figure 5. Each Cordless Handset is assigned to a fixed channel in the CAS+ tie line.

If the main PBX is a MD110 with software BC6.3 or higher, Meridian 1, or Succession 1000M, it supports CAS protocol and can be connected directly to the DCT1800 via the CAS+ interface. Each digital (2 Mbit/s) CAS+ interface has 30 fixed channels to which 30 cordless handsets can be assigned.

Note that each board in DCT1800 supports two CAS+ interfaces while each board in MD110 only supports one CAS+ interface.

Function

All PBX functions associated with an analogue extension, for example call back, call transfer, call diversion, etc. can be used by the cordless handset.

All cordless handsets have their own fixed channels in the CAS+ tie line. If also a fixed telephone is used all calls must be diverted from this to the cordless handset, directly or after a pre-set period. At an incoming call, the main PBX connects the fixed channel in the CAS interface to the Radio Exchange. The Radio Exchange sets up the connection between the cordless handset and the fixed channel via the Base Station. Calls from one cordless handset to another are switched by the main PBX.

CLIP

If the number of the calling party is supported by the PBX this is presented in the display. The cordless handsets also support different ring signals to indicate internal and external calls.

See Function Description, PBXs supporting CAS+ Interface in System 9d, TD 92291GB for more information.

Limitations

- CAS+ extensions, 600 channels (10 boards)
- Simultaneous calls, max. 60.
- Base Stations, max. 200 (25 boards)

- Maximum 300 Cordless Handsets recommended, up to 600 Cordless Handsets is possible (traffic dependent)

3.3 QSIG/DPNSS Interface

Configuration

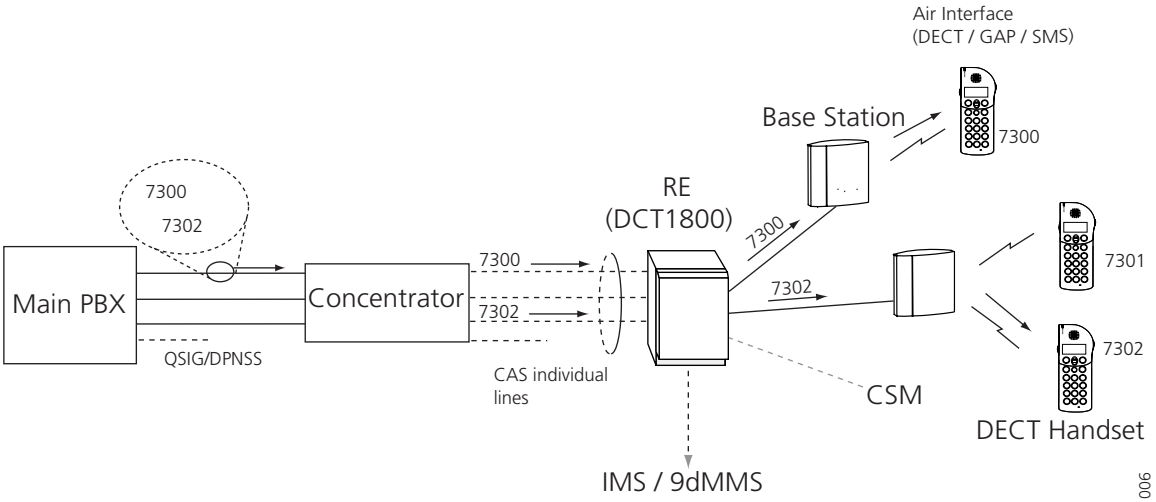


Figure 6. The Cordless Handsets share the resources in the QSIG/DPNSS interface but have their own speech channel in the CAS interface.

The concentrator connects to the main PBX via a digital 2 Mbit/s QSIG (or DPNSS) interface, and to the DCT1800 via a CAS interface. All cordless handsets are sharing the channels in the QSIG/DPNSS link, but have their own fixed channels in the CAS interfaces. The 2 Mbit/s QSIG/DPNSS interface provides 30 shared extensions and every CAS interface has 30 fixed channels to which 30 cordless handsets are assigned.

Function

At an incoming call, the PBX selects a free QSIG/DPNSS channel to the concentrator. The concentrator connects the call to the Radio Exchange, via the fixed channel in the CAS interface. The Radio Exchange sets up the connection between the cordless handset and the fixed channel, via the Base Station. The concentrator in turn connects the fixed channel and the QSIG/DPNSS channel.

Calls from one cordless handset to another are switched by the concentrator and do not load the QSIG/DPNSS link.

CLIP

If the number of the calling party is supported by the PBX this is presented in the display. The cordless handsets also support different ring signals to indicate internal and external calls.

Note that all PBX functions, for example call back at busy, calling name identification and presentation to attendant, may not be available over the QSIG/DPNSS link. This is vendor dependent.

Limitations

- QSIG/DPNSS, 60 channels (1 board) limited by max. simultaneous calls
- CAS individual lines, 600 lines (10 boards)
- Simultaneous calls, max. 60
- Base Stations, max. 200 (25 boards)
- Maximum 300 Cordless Handsets recommended, up to 600 Cordless Handsets is possible (traffic dependent)

3.4 CCS Interface

Configuration

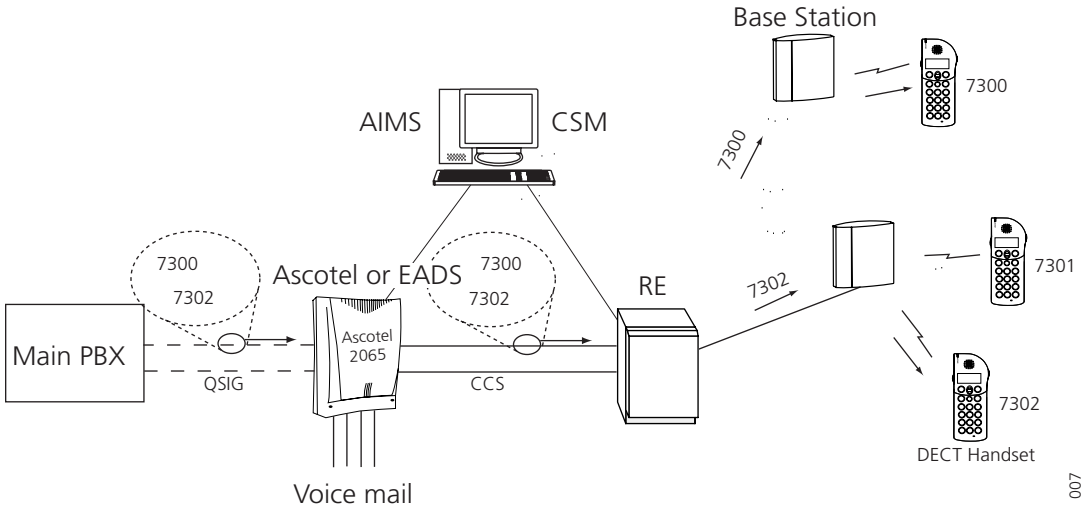


Figure 7. The Cordless Handsets share the resources in a QSIG/CCS configuration.

If the main PBX is an Ascotel I5 (or higher) AMI or an EADS Telecom PBX (M6501/M6540 IP or NeXspan L/S/C/50) it can be connected directly to the Radio Exchange via the 2 Mbit/s CCS interface. However, all PBX suppliers do not support the CCS interface and in that case the Radio Exchange can connect indirectly to the main PBX with an Ascotel or an EADS PBX. All handsets share the same channels to and from the Radio Exchange and it is enough with only one DTU board (i.e. 60 channels) in the Radio Exchange to cover all users (<600) in the cordless telephone system.

In figure 7 an Ascotel 2065 with Ascotel Mobility Interface (AMI) software is used as a QSIG converter to the main PBX. The Ascotel then serves as the PBX for the cordless handsets i.e. the Ascotel provides the switching of the calls and the level of functionality to and from the handsets. The level of QSIG functionality depends on a combination of what is implemented in the main PBX and the Ascotel.

The Radio Exchange uses a Common Channel Signalling (a common name for this protocol is also "S2") path towards the Ascotel/EADS. The S2-protocol is standardised by ETSI and some suppliers uses it to connect to extensions on a Primary Rate interface for example to external voice mail systems. The S2-signalling between the Ascotel/EADS and the Radio Exchange has been improved to also bring user information such as the Display management and Message Waiting Indication (MWI) to the cordless handsets.

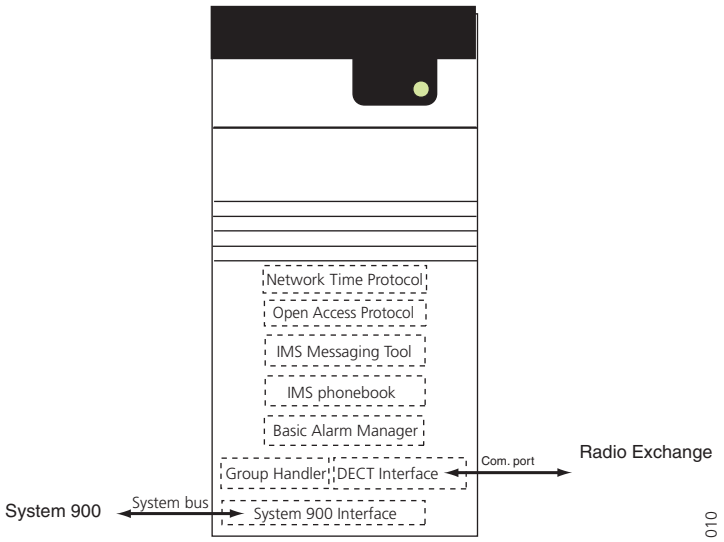
Function and Limitations

Ascotel/EADS supports a high level of functionality, such as; displaying the calling parties name and number, call waiting, call routed to attendant or voice mail in case of no reply, call forwarding, possibilities of having simultaneous, sequential and other types of ringing to a group of subscribers etc.

For more information see:
Function Description, Ascotel Mobility Interface (AMI), TD 92158GB and
Function Description, PBXs supporting CCS Interface in system 9d, TD 92292GB.

4 Messaging Functions, IMS

4.1 Integrated Message Server (IMS)



The Integrated Message Server (IMS) works as an interface between the Radio Exchange and System 900. It contains support for messaging and alarm in the System 9d and includes basic versions of customer tools such as a web based Messaging Tool and Basic Alarm Manager (BAM).

The IMS is based on the ELISE hardware and works on the IP based Unite system platform. The Unite platform makes it possible to connect other Unite modules which enables enhanced system functions, see System Description, Unite, TD 92243GB.

The Network Time Protocol (NTP) makes it possible to synchronize the time in the whole system.

The IMS works as an OAP Server which enables exchange of data between systems and makes messaging from customized applications possible, see Function Description, Open Access Protocol (OAP), TD 92215GB.

System 900 Interface connects directly to the system bus in System 900 and can control the communication on the bus. If no messages are sent on the system bus the central unit in system 900 can be excluded.

DECT Interface is connected via a serial connection to the Radio Exchange in the cordless telephone system.

Group Handler enables 30 groups with up to 15 users in each group and 1 group with up to 50 users.

IMS Phonebook contains 500 entries and is included in the IMS.

For a detailed description of the IMS see Installation and Operation Manual, IMS - Integrated Message Server, TD 92161GB.

4.1.1 Supported Messaging and Alarm Functions

- Every IMS has a licence from start, supporting:
  - basic one-way messaging
  - messages with delivery receipt (automatic acknowledge)
  - messages with manual acknowledge
  - interactive messaging
  - erase of sent messages
  - user data from handsets
  - Short Messaging Service (SMS) between handsets
  - Personal alarm with location information from handsets.

- Following functions are achieved (dependent on licence) by adding an ESS module:
  - Broadcast Messaging
  - Multicast Messaging
  - Remote Management
  - System Survey
  - Fault Logging

  For more information see, Data Sheet, Enhanced System Service (ESS), TD 92250GB.

4.2 Basic Messaging

A message to a cordless handset can be generated either from the message tool in the IMS, contact inputs directly on the IMS, or SMS between the handsets. Via the system bus it is also possible to send text messages from the System 900 to cordless handsets. The message can be initiated by, for example closing (or opening) a contact.

If the system includes NetPage software, text messages can be sent from any PC with a web browser in your network. A customized PC applications can also, via an Open Access Server (OAS), communicate with the System 9d.

Cordless handsets supporting messaging functions is required. Messaging functions in cordless handset are described in respective User Manual, see ''Related Documents'' on page 28.

4.3 Customized Groups

IMS has an integrated Group Handler enabling the creation of 30 groups with up to 15 users in each group, and 1 group with up to 50 users. By adding an ESS to the system larger and more groups with enhanced functions are enabled.

4.4 Messages with Manual Acknowledge Request

Messages with a manual acknowledge request must be acknowledged by the user of the cordless handset. A message with a manual acknowledge request can be sent from the Alarm Module, a Serial Interface connected to external equipment, or the Control Keyboard in System 900. It can also be sent from the IMS (BAM), NetPage, or a customized application via the OAS, in the Unite System.

If the module or external equipment sending the message does not receive the manual acknowledge, it can send the message to other cordless handsets or take other actions.

4.5 Messages with Delivery Receipt Request

When a message with a delivery receipt request is sent to a handset, the handset automatically sends an acknowledge when the message is received. Messages with a delivery receipt request can be sent from an Alarm Module, a Serial Interface connected to external equipment, or the Control Keyboard in System 900. It can also be sent from the IMS (BAM), NetPage, or a customized application via the OAS, in the Unite System.

4.6 SMS (Short Message Service)

SMS can be sent between handsets within the system, and it is also possible to send an SMS to a pre-defined destination address. For more information see the User Manual for respective Cordless Handset.

4.7 Interactive Messaging

Interactive messaging makes it possible for a client application to have a two-way communication in plain language with a user of a cordless handset.

For more information see Function Description, Interactive Messaging (IM), TD 92168GB.

4.8 Broadcast Messaging

With Broadcast messaging it is possible to deliver one message to all users in the system simultaneously. When a message is sent as a broadcast all handsets in the coverage area can receive the message. The system does not get a delivery receipt from the handsets, but the message is sent three times to increase the reliability of the transmission.

An ESS with basic licence and cordless handsets 9d24 Messenger or Protector versions are required.

4.9 Multicast Messaging

Multicast messaging makes it possible to create and reach large groups in the system. A multicast message is sent out simultaneously to all members in the group. All handsets in the coverage area can receive the message. The system does not get a delivery receipt from the handsets, but the message is sent three times to increase the reliability of the transmission.

An ESS with basic licence and cordless handsets 9d24 Messenger or Protector versions are required.

4.10 Absence Handling

Three different types of absence are supported by the system; Automatic-, Manual- and Late absence. When absent, messages can be diverted to another cordless handset or to a pager in the System 900.

Automatic Absence is an option that can be set in the cordless handset. Information is then sent to an ESS, or to the Central Unit in System 900, when the cordless handset is placed in or removed from the charger.

Manual Absence is a function programmable in the handset as a ''Hot Key''. Absent on/off can be selected and sent to an ESS or to the Central in System 900.

Late Absence is a function that is used when the cordless handset can not be reached, for example when it is out of coverage

For more information see Function Description, Number Planning and Message Routing in Unite, TD 92554GB and Function Description, Absence Indication, TD 92101GB.

4.11 Data from Handset

It is possible to send user data from the cordless handset as ''Data Send''. This data is defined by the user and is transmitted by pressing a hot key on the handset. The data is sent to System 900 or the Unite System for distribution to interface modules, for example the Alarm Module, the Output Module, the AMS, or via the OAS to a customized application.

User data can for example be used for opening/closing a door by activating an output connected to a relay on the Output Module, or activate the Alarm Module to send a pre-programmed text message to other cordless handsets.

For more information see, Function Description, Applications based on Sending Data from handset, TD 92095GB.

4.12 DECT Phonebook Service

DECT Phonebook Service is delivered together with the IMS. The function enables access to a centralized telephone number directory from the cordless handset. The telephone directory may be located in the site database or in any MSSQL-compliant database.

DECT Phonebook Service has the same function as the IMS Phonebook. The difference is that the DECT Phonebook service has support for a database that contains more entries. IMS Phonebook and DECT Phonebook service can be used at the same time as long as they have separate addresses.

4.13 Alarm from Handset

Alarm messaging includes all types of alarm from handsets, location etc. Cordless handsets equipped with alarm functions can send different types of alarm messages to the System 900 or the Unite System. The data can be sent to interface modules, for example an Alarm Module or Output Module. The Alarm Module is used to generate group messages to other cordless handsets while the Output Module activates outputs connected to signal lamps or sirens.

Alarm messages can also be sent to an Alarm Manager Server (AMS) for further actions. The AMS can for example activate an output connected to a signal lamp or siren, or present the alarm on a PC with equipped with the AMC software (an Alarm Management Client). The PC can besides the identity, alarm type and time also display the location graphically.

For more information see the document: Function Description, Alarm from Handsets TD 92099GB.

4.13.1 Alarm with data

Additional data for, example a location code, can be sent along with an alarm. The data and type of alarm can be presented on an Alarm Management Client, but it can also be indicated by an Alarm- or Output Module.

For detailed information see the document: Function Description, Alarm from Handsets TD 92099GB.

4.13.2 Alarm with Base Station Location

An approximate location of the cordless handset is possible to add to an alarm sent from the handset. The handset evaluates at alarms the field strength ratio of the individual radio Base Stations and sends the best-rated Base Station as a location of where the alarm was activated. However, positioning based on radio field strength measurements must be regarded as an indication only.

The type of alarm and the location of the handset can be presented on an Alarm Management Client (AMC). The AMC client can besides the identity, alarm type and time also display the location graphically. The alarm can also be indicated by an Alarm- or Output Module.

For detailed information see the document: Function Description, Alarm from Handsets TD 92099GB.

4.13.3 DECT Location

With DECT Location it is possible to send an alarm with the two latest location codes. This makes it possible to decide in which part of a building a person is located, and in which direction he is moving. It does not give an exact location from where an alarm is transmitted but, depending on how many location devices 9dLDs that are used, a high precision of the location can be achieved.

For detailed information see the document: Function Description, DECT Location, TD 92177GB.

4.13.4 Supervision of Handset (Geprüfte Sicherheit GS)

An option in the System 9d is GS (Geprüfte Sicherheit), that is approved to fulfil the German ''Berufsgenossenschaft'' requirements for a Personal Alarm System with speech transmission. GS is intended for people working in environments where a risk of accident exists, for example at industries, prisons, hospitals and power stations.

Special versions of the cordless handset and software PCPRO are required. For detailed information see the document: Function Description, Supervision of Handsets (Geprüfte Sicherheit GS), TD 92091GB.

4.14 Message Handling in IMS

4.14.1 Priorities

Messages are distributed first-hand in priority order and secondly, for messages with same priority, in time order. If distribution of a message fails it returns to the queue but is now the last in time order. A message can be sent three times.

The different priority levels have reserved places of the max. 10 places for active messages. Alarm has 2, high priority has 3, and normal priority has 5 reserved places. But, Alarm is allowed to use all ten places and high priority is allowed to use the five places used for normal priority.

4.14.2 Capacity

Alarm messages from Cordless Handset

Time until received in System 900:	~ 2.5 sec

Incoming messages to Cordless Handset 9d24 (version 3.0 or later)

The time for a message to be delivered differ dependent on how many characters the message contain and if it is delivered to a single handset or a group of handsets.

Number of message characters:	No of Cordless Handsets:	Time in seconds until one handset is paged:
20 characters	1	~ 4
120 characters	1	~ 5
240 characters	1	~ 6
500 characters	1	~ 9

Number of message characters:	No of Cordless Handsets:	Time in seconds until all handsets are paged:
20 characters	1 10 30 100	~ 4 ~ 6 ~ 14 ~ 43
120 characters	1 10 30 100	~ 5 ~ 7 ~ 17 ~ 56

Incoming messages to Cordless Handsets in a broadcast / multicast group

Number of message characters	No of Cordless Handsets:	Time in seconds until the group is paged:
20 characters	Unlimited	~ 4
120 characters	Unlimited	~ 4
240 characters	Unlimited	~ 7
500 characters	Unlimited	~ 14

5 Messaging Functions, 9dMMS

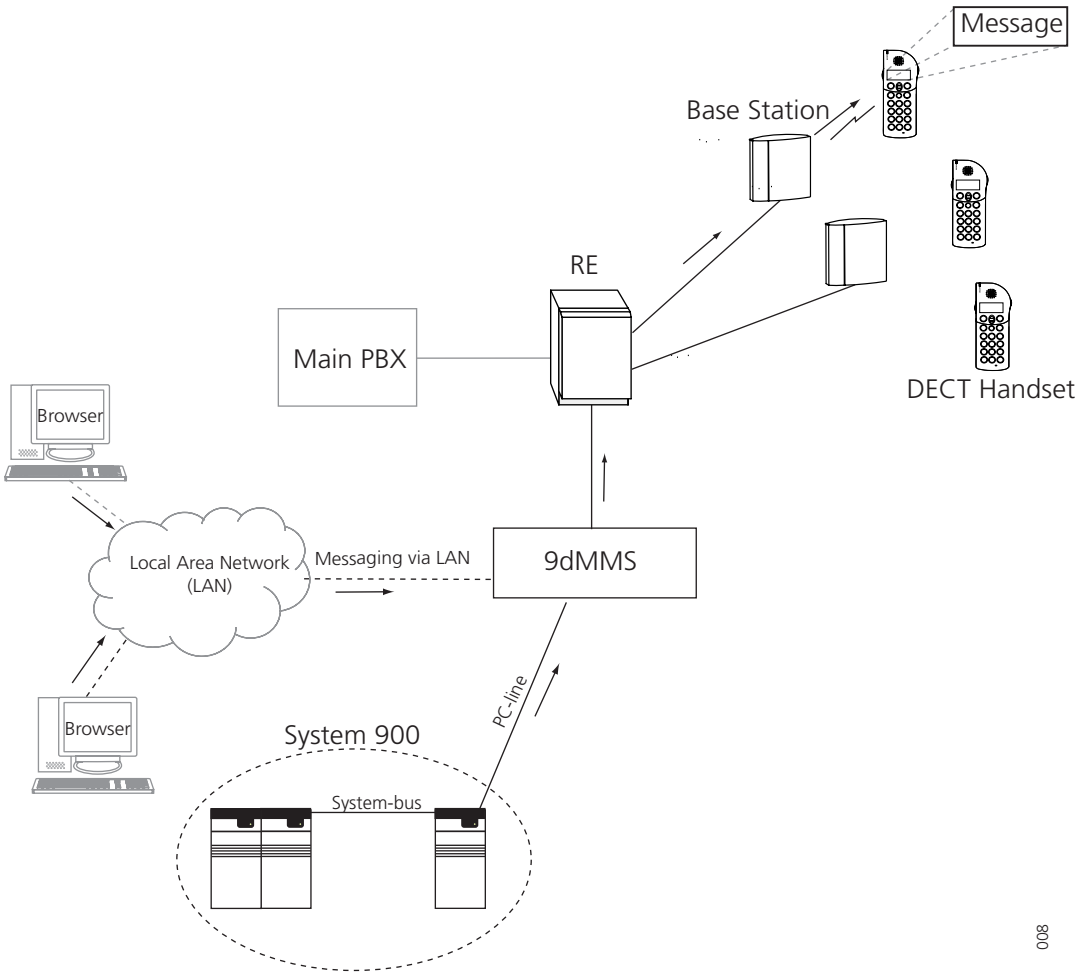
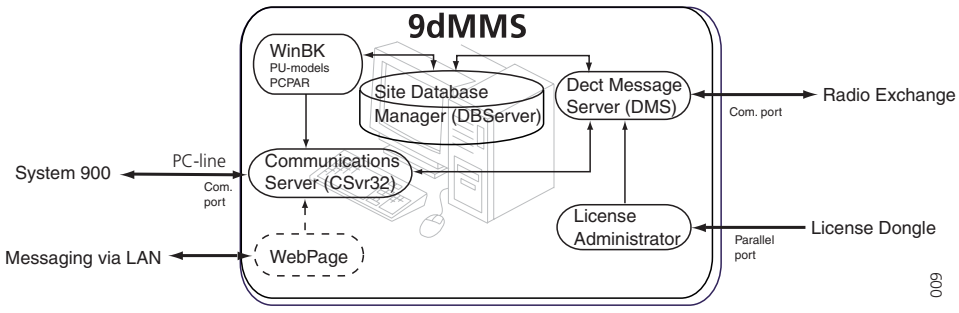


Figure 8. Messages can be sent both from System 900 and a PC with web browser.

5.1 9d Message Mobility Server (9dMMS)



The software package 9dMMS controls the messaging functions (for example, paging and alarm). It is also the link between the RE and the Central Unit in System 900. 9dMMS is installed on a PC using Windows NT as platform. The PC is connected to the Central Unit and to the RE. 9dMMS supports message handling, message acknowledgement, alarm and absent handling. 10 messages can be active at the same time but the message queue can hold up to 200 messages.

9dMMS supplies the software tools for managing the System 9d. It consists of Win BK, Dect Message Server (DMS), Communications Server (CSvr32) and Site Database Manager (DBServer).

WinBK is a system management tool and includes the Pocket Unit administration software.

Dect Message Server is handling the connection to the RE and it controls the paging, alarm, acknowledgement, and absent functions. It is using Site Database Manager to keep track on the cordless handsets, and the Communications Server to connect to the Central Unit in the System 900. When a message is sent it is distributed through the Communication Server to the Dect Message Server. Dect Message Server then checks with the Site Database Manager that the message is intended to a handset. The message is finally distributed to the Radio Exchange and to the handset.

When a handset sends an alarm, the Dect Message Server receives the message from the Radio Exchange and forwards it to the Communications Server.

Communications Server distributes the alarm, acknowledgement or absents message to whatever action that has to be done; for example giving an alarm to an alarm application in the system.

Licence Administrator is the licence tool and handles the licences for Dect Message Server, WebPage, sending messages to cordless handsets, receiving alarm from cordless handsets, and sending ''Data Send'' from cordless handsets.

If desired, the 9dMMS can coexist with the Windows-based software WebPage on the same server (optional). This option gives you possibility to send messages via your web browsers.

5.1.1 Supported Messaging and Alarm Functions

Every 9dMMS has a basic license for 20 users from start. From there it is possible to upgrade to 50, 100 or an unlimited number of users.

- Basic 9dMMS licence supports basic one-way messaging

- Basic 9dMMS licence added with Enhanced messaging supports:
  - group messaging
  - messages with delivery receipt (automatic acknowledge)
  - messages with manual acknowledge
  - user data from handsets
  - conference call
  - message priority handling in 9dMMS
  - absent handling

- Basic 9dMMS licence added with DECT Phonebook Service supports DECT Phonebook Service

- Basic 9dMMS licence added with DECT SMS supports sending SMS between handsets within the system

- Basic 9dMMS licence added with Alarm messaging supports alarm from handsets (includes all types of location information)

5.2 Basic Messaging

Via the PC-line connection it is possible to send text messages from the System 900 to cordless handsets. The message can be initiated by, for example closing (or opening) a

contact. If the system includes WebPage software, text messages can also be sent from any PC with a web browser in your network.

Cordless handsets supporting messaging functions is required. Messaging functions in cordless handset are described in respective User Manual. See ''Related Documents'' on page 28.

5.3 Customized Groups

If a message is to be sent to a group of cordless handsets it is possible to create group numbers in the application Site Manager in 9dMMS. 30 customized groups with up to 10 telephone numbers in each group can be created.

Basic 9dMMS license added with Enhanced messaging is required.

5.4 Messages with Manual Acknowledge Request

Messages with a manual acknowledge request must be acknowledged by the user of the cordless handset.

Messages with a manual acknowledge request can be sent from an Alarm Module, a Serial Interface connected to external equipment and the Control Keyboard. It can also be sent from a PC with the software PCPRO. (The PC is connected to the system via an Alarm Interface).

If the module or external equipment sending the message does not receive the manual acknowledge, it can send the message to other cordless handsets or take other actions. Basic 9dMMS license added with Enhanced messaging is required.

For detailed information see the document: Function Description, Manual Acknowledgement, TD 92096GB

5.5 Messages with Delivery Receipt Request

When a message with a request for a delivery receipt (automatic acknowledge) is sent to a handset, the handset automatically sends an acknowledge when the message is received.

Messages with delivery receipt can be sent from an Alarm Module, a Serial Interface connected to external equipment and the Control Keyboard.

Basic 9dMMS license added with Enhanced messaging is required.

5.6 SMS (Short Message Service)

SMS can be sent between cordless handsets within the system, and it is also possible to send an SMS to a pre-defined destination address. More information see respective User Manual. See ''Related Documents'' on page 28.

Basic 9dMMS license added with DECT SMS handset to handset is required.

Note: PBX dependent

5.7 Conference Call

Conference call is a function that enables a group of users to have a cordless telephone conference. A separate set of trunk lines with ''hunting'' in the main PBX and one Conference

Line Module (CLM) for each line is needed. The number of CLM modules determines how many of the group members that can be connected to one conference call. If there are more members in the group than the number of CLM modules, the last members answering get busy signal.

Different conference groups can share CLM modules but if there is a conference call in progress, members in the second group get the next free lines and will overhear the first call, or get busy signal if all lines are occupied. To ensure overhearing and occupied lines it is recommended that every conference group have their own set of tie lines and CLM modules.

A conference call can be started at special events from, for example an Alarm Module triggered by a machine alarm. The module sends a message to a group of cordless handsets and 9dMMS adds the dial code to the tie lines when it indicates the group number as a conference call number. The message received in the cordless handset consists of the text message and the dial code. When the hook is pressed the dial code is dialled from the handset and the call is connected to the first free CLM module. Every handset connected to a CLM module will be connected in a group via a speech bus on the CLM modules. A conference call may also include Control Keyboards, PBX Interface modules, and U922 transceivers if the speech bus on the CLM modules is connected to the speech bus in the System 900.

Basic 9dMMS license added with Enhanced messaging is required.

For more information see the document: Function Description, Conference Call, TD 92100GB.

5.8 Absence Handling

Three different types of absence are supported by the system; Automatic-, Manual- and Late absence. When absent, messages can be diverted to another cordless handset or to a pager in the System 900.

Automatic Absence is an option in the cordless handset. When enabled, set/reset ''absence'' is sent to the Central Unit when the cordless handset is placed in or removed from the charger.

Manual Absence is a function programmable in the handset as a ''Hot Key''. Absent on/off can be selected and sent to the Central Unit.

Late Absence is a function that is used when the cordless handset can not be reached, for example when it is out of coverage

Basic 9dMMS license added with Enhanced messaging is required.

For detailed information see the document: Function Description, Absence Indication, TD 92101GB.

5.9 Data from Handset

It is possible to send data from the handset as ''Data Send''. This data is defined by the user, and is transmitted by pressing a hot key on the handset. The data is sent to the System 900 and is then distributed to interface modules, for example an Alarm Module or Output Module. User data can for example be used for opening/closing a door by activating an output on the Output Module connected to a relay. It can also activate the Alarm Module to send a pre-programmed text message to other cordless handsets.

Basic 9dMMS licence added with Enhanced messaging is required.

For detailed information see the document: Function Description, Applications based on Sending Data from handset, TD 92095GB.

5.10 DECT Phonebook Service

The function enables access to a centralized telephone number directory from the cordless handset. Depending the DECT Phonebook Service license (Basic or Professional) the telephone directory may be located in the site database or in any MSSQL-compliant database.

Basic 9dMMS license added with DECT Phonebook Service is required.

5.11 Alarm from Handset

Alarm messaging includes all types of alarm from handsets, location etc.

Cordless handsets equipped with alarm functions can send different types of alarm messages to the System 900. The alarm message is then distributed to interface modules, for example an Alarm Module or Output Module for further actions. The Alarm Module is used to generate group messages to other cordless handsets while the Output Module activates outputs connected to signal lamps or sirens.

Alarm messages can also, via an Alarm Interface be presented on a PC with the software PCPRO. The PC can besides the identity, alarm type and time also display the location graphically.

Basic 9dMMS license added with Alarm messaging is required.

For detailed information see the document: Function Description, Alarm from Handsets TD 92099GB

5.11.1 Alarm with data

Additional data for, example a location code, can be sent along with an alarm. The data and type of alarm can be displayed on a PC with the software PCPRO, but it can also be indicated by an Alarm- or Output Module.

For detailed information see the document: Function Description, Alarm from Handsets TD 92099GB

5.11.2 Alarm with Base Station Location

An approximate location of the cordless handset is possible to add to an alarm sent from the handset. The handset evaluates at alarms the field strength ratio of the individual radio Base Stations and sends the best-rated Base Station as a location of where the alarm was activated. However, positioning based on radio field strength measurements must be regarded as an indication only.

The type of alarm and the location of the cordless handset can be displayed on a PC with the software PCPRO. The PC can besides the identity, alarm type and time also display the location graphically. The alarm can also be indicated by an Alarm- or Output Module.

For detailed information see the document: Function Description, Alarm from Handsets TD 92099GB

5.11.3 DECT Location

With DECT Location it is possible to send an alarm with the two latest location codes. This makes it possible to decide in which part of a building a person is located, and in which direction he is moving. It does not give an exact location from where an alarm is transmitted but, depending on how many location devices 9dLDs that are used, a high precision of the location can be achieved.

For detailed information see the document: Function Description, DECT Location, TD 92177GB

5.11.4 Supervision of Handset (Geprüfte Sicherheit GS)

An option in the System 9d is GS (Geprüfte Sicherheit), that is approved to fulfil the German ''Berufsgenossenschaft'' requirements for a Personal Alarm System with speech transmission. GS is intended for people working in environments where a risk of accident exists, for example at industries, prisons, hospitals and power stations.

Special versions of the 9d23 MkII Handset and software PCPRO are required. For detailed information see the document: Function Description, Supervision of Handsets (Geprüfte Sicherheit GS), TD 92091GB

5.12 Message Handling in 9dMMS

Priorities

Messages are distributed first-hand in priority order and secondly, for messages with same priority, in time order. If distribution of a message fails it returns to the queue but is now the last in time order. A message can be sent three times.

The different priority levels have reserved places of the max. 10 places for active messages. Alarm has 2, high priority has 3, and normal priority has 5 reserved places. But, Alarm is allowed to use all ten places and high priority is allowed to use the five places used for normal priority.

Capacity

Time for sending Alarm messages from Cordless Handset until received in the System 900:	~ 2.5 sec

Time for incoming messages to Cordless Handset until all handsets are paged	**No of Cordless Handsets:**	**Time in seconds:**
Messages with 20 characters:	1 10 30 100	~ 4 ~ 6 ~ 14 ~ 43
Messages with 120 characters:	1 10 30 100	~ 5 ~ 7 ~ 17 ~ 56

6 System Management

6.1 System 900 Manager – WinBK

The software package WinBK is the system management tool and used for configuration and administration of System 900. WinBK is included in the software package 9dMMS and is operating in the same PC.

For detailed description of WinBK see: User Guide WinBK 5.0, TD 91592GB.

6.2 Cordless System Manager (CSM)

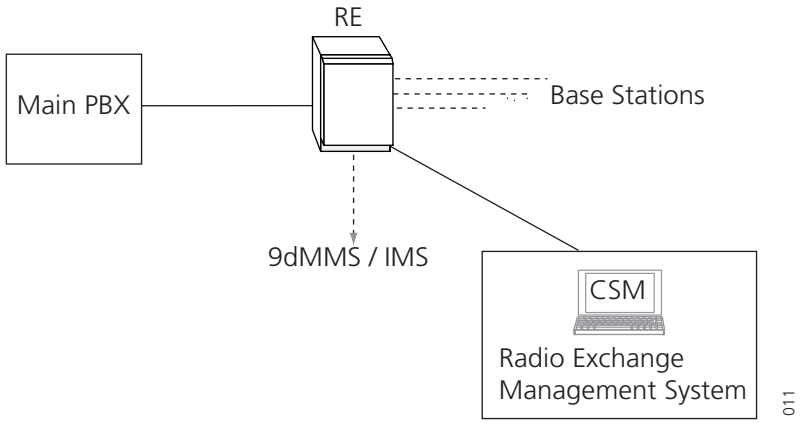


Figure 9. Management system for the Radio Exchange

The software CSM is required for cordless telephone system initialization, system maintenance and updating, system trouble shooting and repair. It can be operating in the same PC as 9dMMS.

For more information see: Technical Product Manual DCT1800-GAP.

6.3 Remote Management

Remote management of System 9d is enabled by connecting an ESS module on the Unite platform. The CSM software and WinBK can be operating on the same PC.

For more information see:Function Description, Remote Management, TD 92257GB.

6.4 Clock Synchronisation

It is possible to synchronize the clocks in the whole system by a setting in the IMS. See, Installation Guide ELISE2, TD 92232GB.

7 System Error Handling

7.1 IMS

The IMS has a function indicator that visibly indicates different status of the module. It also has an error relay which releases when IMS has lost communication with a system, shut down, restarted etc. The error relay can be connected to a siren or a signal lamp.

In a system with many components and interfaces, there is a need to be able to survey and supervise the whole system, not only the modules and components themselves. This centralised system survey and supervision is solved by using the Enhanced System Services (ESS).

For more information see Function Description, System supervision and Fault Handling in Unite, TD 92252GB.

7.2 9dMMS

To ensure the safety of the message handling, the connections from 9dMMS to the Radio Exchange and to the Central Unit are both supervised. Dect Message Server in 9dMMS is taking care of the connection to the Radio Exchange and sends a status report to the Central Unit in case of error, while the PC-line connection is supervised by the Central Unit. In both cases, the errors are indicated by the Central Unit.

To notify an error the Central Unit can be programmed to activate the system relay or to initiate a paging to a pager in System 900 with a predefined display message. The system relay can be connected to a siren or a signal lamp. When the connection is working again a ''System OK'' message can be sent to a cordless handset.

7.3 Radio Exchange

The Radio Exchange DCT1800 has an error relay that can be used for notification of faults. If connected to an input on an Alarm Module a predefined text message informing that an error has occurred, can be sent to a cordless handset.

More detailed error reports can be sent from the Radio Exchange, via the IMS, to an ESS. The error reports can be both persistent and non-persistent errors, persistent means that the error is reported as active until it has been taken care of, either manually or automatically by the reporting system.

Example:

- Non-persistent errors:
  - System restarts
  - Communication errors

- Persistent errors:
  - Board errors
  - CPU (Central Processing Unit) errors
  - Base Station errors

If the communication should fail between the Radio Exchange and the IMS, the Radio Exchange will notify the CSM and the IMS will notify the ESS.

For more information see System Description, Unite, TD 92243GB.

8 System Logging

System logging is activated from the CSM. The CSM generates one log file every 24 hour and sends it to a specified directory. The logfile can then be analyzed with an excel tool, the Cordless System Analyser.

The analyze shows the total number of calls, dropped calls, call lists, number of calls on every base station, system load, handovers, etc.

9 Related Documents

Technical Product Manual DCT1800-GAP	TD92093GB
Installation and Maintenance Guide DCT1800-S	
User´s Guide DCT1800-S	
System Description, On Site Paging System	TD 91024GB
System Description, Personal Security System	TD 90677GB
System Description, Unite	TD 92243GB
User Guide WinBK 5.0	TD 91592GB
User Guide 9d23	M0225130
User guide 9d23 MkII	M0262101
Quick Reference Guide 9d24	M0263330
Quick Reference Guide OfficeM	M0269601
User Manual 9d23	TD 91815GB
User Manual 9d23 MkII	TD 92089GB
User Manual 9d24	TD 92136GB
User Manual OfficeM	TD 92288GB
Data Sheet, 9dMMS	TD 91720GB
Data sheet, Integrated Message server (IMS)	TD 92160GB
Data Sheet, Enhanced System Service (ESS)	TD 92250GB
Data Sheet, Central Unit T942C	TD 91681GB
Data Sheet, Output module T941OM	TD 90864GB
Data Sheet, Alarm Modules T941AM8/AM32	TD 90862GB
Data Sheet, Alarm Interface P940AI	TD 90630GB
Data Sheet, PBX Interface T942PX	TD 91032GB
Data Sheet, Control Keyboard H900C, H900T, T900R	TD 90350GB
Data Sheet, AMS Alarm Management Server	TD 92144GB
Installation Guide ELISE2	TD 92232GB
Installation and Operation Manual, 9d Message Mobility Server	TD 91835GB
Installation and Operation Manual, WebPage 1.3	TD 91740GB
Installation and Operation Manual, IMS - Integrated Message Server	TD 92161GB
Installation and Operation Manual, AMS Alarm Management Server	TD 92047GB
Installation and Operation Manual, Alarm Management Client	TD 92145Gb
Installation and Operation Manual, Enhanced System Service (ESS)	TD 92253GB
Function Description, Ascotel Mobility Interface (AMI)	TD 92158GB
Function Description, PBXs supporting CAS+ Interface in System 9d	TD 92291GB
Function Description, PBXs supporting CCS Interface in system 9d	TD 92292GB
Function Description, Interactive Messaging (IM)	TD 92168GB
Function Description, System supervision and Fault Handling in Unite	TD 92252GB
Function Description, Number Planning and Message Routing in Unite	TD 92554GB
Function Description, Remote Management	TD 92257GB
Function Description, Open Access Protocol (OAP)	TD 92215GB

Function Description, Supervision of Handsets (Geprüfte Sicherheit GS)	TD 92091GB
Function Description, Applications based on Sending Data from handset	TD 92095GB
Function Description, Manual Acknowledgement	TD 92096GB
Function Description, Alarm from Handsets	TD 92099GB
Function Description, Conference Call	TD 92100GB
Function Description, Absence Indication	TD 92101GB
Function Description, DECT Location	TD 92177GB

10 Document History

For details in the latest version, see change bars in the document.

Version	Date	Description
G	4 February 2011	Added: A.8 DECT protocol limitation on page 33

Appendix A: System Capacity

A.1 Physical limitations of a DCT1800 system

No. of cabinets per system:	4
System boards per cabinet:	9

A.2 Capacity dependent on the configuration PBX – RE

DCT1800-S System with Analogue Individual lines

Analogue individual lines:	40 (5 LTU boards)
Cordless Handsets:	40
Base stations:	8
Simultaneous calls:	16

DCT1800 System with Analogue Individual lines

Analogue individual lines:	224 (28 LTU boards)[a]
Cordless Handsets:	224
Base stations:	200 (25 SLU boards)[a]
Simultaneous calls:	60

a. Depends on system configuration, see table on page 8.

DCT1800 System with CAS+ Individual line

CAS+ extensions:	600 channels (10 DTU boards)
Cordless Handsets:	300 is recommended, up to 600 is possible, traffic dependent
Base stations:	200 (25 SLU boards)
Simultaneous calls:	60

DCT1800 System with QSIG/DPNSS Interface

QSIG/DPNSS: (main PBX – Concentrator)	60 channels, limited by maximum simultaneous calls.
CAS individual lines: (Concentrator – RE)	600 lines (10 DTU boards)
Cordless Handsets:	300 is recommended, up to 600 is possible, traffic dependent
Base stations:	200 (25 SLU boards)
Simultaneous calls:	60

DCT1800 System with AMI as QSIG Interface

QSIG: (main PBX – Ascotel)	60 channels, limited by maximum simultaneous calls.
CCS : (Ascotel – RE)	60 channels (1 DTU board),
Cordless Handsets:	up to 200 (AscotelI5) up to 400 (AscotelI6)
Base stations:	200 (25 SLU boards)
Simultaneous calls:	60

DCT1800 System with CCS Interface

CCS: (main PBX – RE)	60 channels (1 DTU board), limited by maximum simultaneous calls.
Cordless Handsets:	AscotelI5: up to 200 AscotelI6: up to 400 EADS Telecom PBXs: 300 is recommended, up to 600 is possible, traffic dependent
Base stations:	200 (25 SLU boards)
Simultaneous calls:	60

A.3 Telephony

Capacity in Erlang

System:	maximum 44.8 erlang with a Grade Of Service (GOS) of 0.005 (at 60 simultaneous calls).
Base Station:	maximum 2.7 erlang with a Grade Of Service (GOS) of 0.005

No. of call setup per hour

System:	3600

A.4 Alarm message sent from Handset

Until received in System 900:	~ 2.5 seconds
Until received in IMS:	~ 2.5 seconds

A.5 Messaging handling

IMS

No. of Messages per hour:	3600
Message Speed: (to single handset and group of handsets)	Depends on No. of characters in the message and No. of handsets the message is sent to. See the table Incoming messages to Cordless Handset 9d24 (version 3.0 or later) on page 18.
Message Speed: (to Multicast/Broadcast groups)	Depends on No. of characters in the message. See the table Incoming messages to Cordless Handsets in a broadcast / multicast group on page 18.

9dMMS

No. of Messages per hour:	3600
Message Speed: (to single handset and group of handsets)	Depends on No.of characters in the message and No. of handsets the message is sent to. See table Time for incoming messages to Cordless Handset until all handsets are paged on page 24.

A.6 Maximum simultaneous Calls, Alarm and Messaging per Base Station

Base station BS330/BS340 with 12 channels[a]

Speech calls:	8 max.
Alarm and SMS to and from handsets:	10 max.
Multicast/Broadcast messages:	One reserved channel

Wireless Base station BS370 with 5 channels

Calls/SMS/Alarm:	5 max.
Multicast/Broadcast messages:	One reserved channel

a.See Figure 2. Channel distribution in the base Station on page 5.

A.7 Cabling

Base Station cable:	1.9 km with standard CAT5 cable

A.8 DECT protocol limitation

When using legacy paging there are limitations compared with IM (Interactive Messaging) due the protocol used. The information transferred over the DECT link are:

- Subject and Body are concatenated
- Destination / Call ID
- Message Id
- Beep
- Urgent
- Color
- Confirmation Request (is handled as separate block in Unite)

Other information set by applications by OA-XML / AMS / Xgate will not be transferred.

- Repetition
- Interval time
- Number of repetitions

Appendix B: Other Documentation

As complementary reading the following documentation is available.

System Planning (On Site Paging - and Personal Security Systems)

Is to be read after taking part of the System Description. It describes different functions and possible technical solutions in the system. It also deals with various factors that can affect the future installation.
Target groups: technical engineers planning the system.

System Installation (On Site Paging - and Personal Security Systems)

Primarily explains system dependent aspects to be considered at system installation and gives an overview of how to install the system.
Target groups: technical engineers planning the system and service technicians installing it.

Note: Further information and guide lines how to install the separate units included in a system, is described in an Installation Guide for each unit.

Installation Guide

Describes how to install any fixed units in the system 900.
Target groups: installation- and service personnel.

Installation and Operation Manual

Describes how to install and operate different PC software programmes. In many cases complemented with or replaced by on-line help or CD.
Target groups: service engineer or administration responsible of the end user system.

On-Line Help

Gives direct help and information via the PC screen.

Data Sheet

Describes up-to-date technical data of a particular product or software. It includes a short presentation of features, applications and possibly extended functions with other software/ products.
Target groups: end customer, system responsible, technical engineers and sales department.

User Guide/Quick Reference Guide

This document is available for pocket units only. It contains a concise, how to use description, and is normally distributed together with the pocket unit.
Target groups: user of the pocket unit for quick learning of the included functions.

User Manual

Is a complement to the user guide. It gives a thorough description of the specific functions and how to use the product, for example a pocket receiver.
Target groups: responsible for handling the administration and distribution of pocket units at the end customer site, or anyone interested to get deeper usage knowledge.

Alignment and Adjustment

An instruction for alignment and adjustment of the unit.
Target groups: installation- and service personnel.

Circuit Description

Together with schematics (electrical and component) this document is a good source for trouble shooting.
Target groups: service- and support technicians.

Parameter List

Study of the parameter lists is a way to increase comprehension for how different functions in the system work.
Target groups: service personnel that program fixed units in installations and execute advanced trouble shooting.

Electrical Diagram

Used as a complement for trouble shooting.
Target groups: installation personnel, service- and support technicians.

Component Layout

Used as a complement for trouble shooting.
Target groups: installation personnel, service- and support technicians.

Product News/Technical News

Product News and Technical News are distributed continuously on the web site.
Target groups: principally for sales departments and technical engineers at our subsidiaries.